

LISTING OF CLAIMS

Claim 1 (Currently amended): An electrical stimulator for the treatment of intractable pain syndromes, comprising:

an interferential current generator[[,]] comprising common sine wave generators which generate an interferential alternating current output and generate a sine-wave-like output waveform comprising first and second sinusoidal signals having different first and second frequencies, with a base medium frequency of at least 500Hz but no more than 20KHz; and

at least two pairs of implantable electrodes having first and second ends, wherein the first ends are connected to said interferential current generator and ~~adapted to be~~ the second ends are implanted to a dura matter in an epidural space located at predetermined locations proximate to a subject's spinal cord, and wherein each pair of said at least two pairs of implantable electrodes produces a separate electrical circuit, each transmitting one of said first and second sinusoidal signals, such that the first and second frequencies interfere with each other to produce at least one beat frequency signal proximate to the subject's spinal cord.

Claim 2 (Previously presented): The stimulator of claim 1, wherein said interferential current generator comprises:

a pulse generator that generates digital signal pulses; and

a digital signal processor connected to said pulse generator that processes the digital signal pulses to approximate the sine-wave-like output waveform.

Claim 3 (Previously presented): The stimulator of claim 1, wherein said interferential current generator comprises:

a pulse generator that generates digital signal pulses; and

a field-programmable gate array connected to said pulse generator that processes the digital signal pulses to approximate the sine-wave-like output waveform.

Claim 4 (Original): The stimulator of claim 1, wherein said interferential current includes a resultant beat frequency of no more than 250 Hz.

Claim 5 (Original): The stimulator of claim 1, wherein said interferential current includes a voltage output of 11 volts maximum for each circuit.

Claim 6 (Original): The stimulator of claim 1, wherein said interferential current includes a pulse width of 210 microseconds.

Claim 7 (Original): The stimulator of claim 1, wherein said interferential current include s a pulse width with a range of at least 10 microseconds but no more than 600 microseconds.

Claim 8 (Previously presented): The stimulator of claim 1, wherein the at least two pairs of implantable electrodes comprise two quadripolar leads used to produce two interferential currents.

Claim 9 (Withdrawn): An electrical stimulator for the treatment of intractable pain syndromes, comprising:

- a pulse generator that generates digital signal pulses;

- a digital signal processor connected to said pulse generator that generates a sine-wave-like output waveform that is further processed into first and second circuits having different first and second output frequencies; and

- two pairs of implantable electrodes connected to said digital signal processor and adapted to be positioned proximate to a subject's spinal cord at predetermined locations such that the different output frequencies from said first and second circuits interfere to produce at least one beat frequency signal proximate to the spinal cord.

Claim 10 (Withdrawn): The stimulator of claim 9, wherein said interferential current output waveform includes a base medium frequency of at least 500Hz but no more than 20KHz.

Claim 11 (Withdrawn): The stimulator of claim 9, wherein said interferential current output waveform includes a resultant beat frequency of no more than 250 Hz.

Claim 12 (Withdrawn): An electrical stimulator for the treatment of intractable pain syndromes, comprising:

a pulse generator that generates digital signal pulses;

a field-programmable gate array connected to said pulse generator that generates a sine-wave-like output waveform that is further processed into first and second circuits having different first and second output frequencies; and

two pairs of implantable electrodes connected to said field-programmable gate array and adapted to be positioned proximate to a subject's spinal cord at predetermined locations

such that the different output frequencies from said first and second circuits interfere to produce at least one beat frequency signal proximate to the spinal cord.

Claim 13 (Withdrawn): The stimulator of claim 12, wherein said interferential current output waveform includes a base medium frequency of at least 500Hz but no more than 20KHz.

Claim 14 (Withdrawn): The stimulator of claim 12, wherein said interferential current waveform includes a resultant beat frequency of no more than 250 Hz.

Claim 15 (Currently amended): An electrical stimulator for the treatment of intractable pain syndromes, comprising:

an interferential current generator that generates an interferential alternating current output including first and second sinusoidal signals having different first and second frequencies, with a base medium frequency of at least 500Hz but no more than 20KHz; and

at least two pairs of implantable electrodes having first and second ends,
wherein the first ends are connected to said interferential current generator and
the second ends are implanted to a dura matter in an epidural space ~~located~~ at predetermined
locations proximate to a subject's dorsal column, and

wherein each of said at least two pairs of implantable electrodes produces a separate electrical circuit, each carrying one of said first and second sinusoidal signals, such that the first and second frequencies interfere with each other to produce at least one beat frequency signal proximate to the subject's dorsal column.

Claim 16 (Original): The stimulator of claim 15, wherein said interferential current generator comprises:

a pulse generator that generates digital signal pulses; and

a digital signal processor connected to said pulse generator that processes the digital signal pulses to approximate a sine-wave-like output waveform.

Claim 17 (Original): The stimulator of claim 15, wherein said interferential current generator comprises:

a pulse generator that generates digital signal pulses; and

a field-programmable gate array connected to said pulse generator that processes the digital signal pulses to approximate a sine-wave-like output waveform.

Claim 18 (Original): The stimulator of claim 15, wherein said interferential current includes a resultant beat frequency of no more than 250 Hz.

Claim 19 (Original): The stimulator of claim 15, wherein said interferential current includes a voltage output of 11 volts maximum for each circuit.

Claim 20 (Original): The stimulator of claim 15, wherein said interferential current includes a pulse width of 210 microseconds.

Claim 21 (Original): The stimulator of claim 15, wherein said interferential current includes a pulse width with a range of at least 10 microseconds but no more than 600 microseconds.

Claim 22 (Previously presented): The stimulator of claim 15, wherein the at least two pairs of implantable electrodes comprise two quadripolar leads used to produce two interferential currents.

Claim 27 (Withdrawn): The stimulator of claim 26, wherein said interferential current output waveform includes a base medium frequency of at least 500Hz but no more than 20KHz.

Claim 28 (Withdrawn): The stimulator of claim 26, wherein said interferential current waveform includes a resultant beat frequency of no more than 250 Hz.

Claim 29 (Withdrawn): A method for the treatment of persistent chronic pain syndromes using electrical stimulation of the spinal cord, said method comprising:

supplying digital signal pulses to a digital signal processor via a pulse generator;

positioning a first pair of implantable electrodes proximate to a subject's spinal cord at predetermined locations proximate to a targeted area;

positioning a second pair of implantable electrodes proximate to the subject's spinal cord at predetermined locations proximate to the targeted area; and

transmitting waveforms of different first and second frequencies through first and second circuits, the first and second circuits being created through said first and second pairs of implantable electrodes respectively, so that the first and second frequencies interfere to create at least one beat signal proximate to the targeted area, thus creating an interferential current with a base medium frequency of at least 500Hz but no more than 20KHz.

Claim 30 (Withdrawn): The method according to claim 29, wherein said method further includes varying locations of said first and second pairs of implantable electrodes along the spinal cord.

Claim 31 (Withdrawn): The method according to claim 29, wherein said method further includes modulating outputs of amplitudes of said first and second circuits.

Claim 32 (Withdrawn): The method according to claim 29, wherein said method includes creating an interferential current with a resultant beat frequency of no more than 250 Hz.

Claim 23 (Withdrawn): An electrical stimulator for the treatment of intractable pain syndromes, comprising:

a pulse generator that generates digital signal pulses;

a digital signal processor connected to said pulse generator that generates a sine-wave-like output waveform that is further processed into first and second circuits having different first and second output frequencies; and

two pairs of implantable electrodes connected to said digital signal processor and adapted to be positioned proximate to a subject's dorsal column at predetermined locations such that the different output frequencies from said first and second circuits interfere to produce at least one beat frequency signal proximate to the dorsal column.

Claim 24 (Withdrawn): The stimulator of claim 23, wherein said interferential current output waveform includes a base medium frequency of at least 500Hz but no more than 20KHz.

Claim 25 (Withdrawn): The stimulator of claim 23, wherein said interferential current output waveform includes a resultant beat frequency of no more than 250 Hz.

Claim 26 (Withdrawn): An electrical stimulator for the treatment of intractable pain syndromes, comprising:

a pulse generator that generates digital signal pulses;

a field-programmable gate array connected to said pulse generator that generates a sine-wave-like output waveform that is further processed into first and second circuits having different first and second output frequencies; and

two pairs of implantable electrodes connected to said field-programmable gate array and adapted to be positioned proximate to a subject's dorsal column at predetermined locations such that the different output frequencies from said first and second circuits interfere to produce at least one beat frequency signal proximate to the dorsal column.

Claim 33 (Withdrawn): The method according to claim 29, wherein said method includes creating the interferential current with a voltage output of 11 volts maximum for each circuit.

Claim 34 (Withdrawn): The method according to claim 29, wherein said method includes creating the interferential current with a pulse width of 210 microseconds.

Claim 35 (Withdrawn): The method according to claim 29, wherein said method includes creating the interferential current with a pulse width comprising a range of at least 10 microseconds but no more than 600 microseconds.

Claim 36 (Withdrawn): The method according to claim 29, wherein said method includes creating two interferential currents by using two quadripolar leads.

Claim 37 (Withdrawn): A method for electrical stimulation of the spinal cord, said method comprising:

- a field-programmable gate array via a pulse generator;
- positioning a first pair of implantable electrodes proximate to a subject's dorsal column at predetermined locations proximate to a targeted area;
- positioning a second pair of implantable electrodes proximate to the subject's dorsal column at the predetermined locations proximate to the targeted area; and
- transmitting waveforms of different first and second frequencies through said first and second circuits, the first and second circuits being created through the first and second pairs of implantable electrodes respectively, so that the first and second frequencies interfere to create at least one beat signal proximate to the targeted area, thus creating an interferential current with a base medium frequency of at least 500Hz but no more than 20KHz.

Claim 38 (Withdrawn): The method according to claim 37, wherein said method further includes varying positions of said first and second pairs of implantable electrodes along the dorsal column.

Claim 39 (Withdrawn): The method according to claim 37, wherein said method further includes modulating outputs of amplitudes of said first and second circuits.

Claim 40 (Withdrawn): The method according to claim 37, wherein said method includes creating an interferential current with a resultant beat frequency of no more than 250 Hz.

Claim 41 (Withdrawn): The method according to claim 37, wherein said method includes creating an interferential current with a pulse width of 210 microseconds.

Claim 42 (Withdrawn): The method according to claim 37, wherein said method includes creating two interferential currents by using two quadripolar leads.